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CONTENTS

Contribution of Bryn Mawr College to the Higher Education of Women: DR. WILLIAM H. WELCH 1

"The Friendly Arctic": D. JENNESS 8

Scientific Events:

Pasteur as Drama; Foreign Students and the Federal Immigration Laws; Textile Research Institute; The Chemical Foundation; The Rockefeller Institute for Medical Research 12

Scientific Notes and News 15

University and Educational Notes 17

Discussion:

Bacterial Plant Diseases in the Philippine Islands: COLIN G. WELLES. *Swordfish taken on Trawl Lines:* DR. CHAS. HASKINS TOWNSEND. *Mexican Archeology:* ZELIA NUTTALL 18

Quotations:

The Isotopes of Tin 19

Special Articles:

Craterlets in East-Central Arkansas, probably due to the New Madrid Earthquake: E. T. THOMAS. *Azotobacter in Soils:* P. L. GAINEY 20

The American Chemical Society: DR. CHARLES L. PARSONS 21

CONTRIBUTION OF BRYN MAWR COLLEGE TO THE HIGHER EDUCATION OF WOMEN[1]

THE retirement of Miss Thomas from the presidency of Bryn Mawr College, whose destinies she has guided since its formal opening thirty-seven years ago—for nine years as dean in association with President Rhoads, and for twenty-eight as president—and whose ideals, policies and achievements are in so large measure the work of her creative genius, turns our thoughts inevitably to the consideration of these ideals and achievements and to the contributions which this college has made to the higher education of women during her administration. These reflections may serve to lighten in some degree the feelings of sorrow and regret aroused by the severance of relations so long sustained, so rich in accomplishment and so warmly cherished by the students, graduates and other members and friends of this college.

Bryn Mawr began its work at an interesting period in the development of higher education in this country. The path had already been blazed for the collegiate education of women. Each type of institution now recognized—the coeducational, the affiliated and the separate college for women—had been in existence for several years—the coeducational, indeed, for over half a century—and with growing success. But the hard-fought battle was still on. In order to realize how complete has been the victory, how great the advance, recall the changed attitude of the public mind since those days toward college education for girls, indeed the present wide recognition of its vital importance for civilization under the new social order, the many problems then open and now solved—although there

[1] Address at the commencement exercises on June 8, 1922, upon the retirement of President Thomas from the presidency of Bryn Mawr College.

will always be open problems enough in the educational field—the many opportunities for advanced study and research and the careers now open to women and the large achievements of to-day as contrasted with the relatively meager results of those earlier years. In this forward movement Bryn Mawr under the leadership of President Thomas has held a position in the front rank.

Certain fundamental questions, once hotly contested, have been so completely and definitely settled that it is a waste of time longer to discuss them. My profession has at last given its reluctant consent to the proposition that the health of girls is generally benefited rather than impaired by the conditions of college life. The demonstration of the capacity of young women to meet all the mental tests of college work at least as successfully as men students is complete and convincing. College breeding, instead of sacrificing, enhances womanly charm, attractiveness and fitness for domestic happiness. Girls go to college for the same varied reasons, aims, motives and ambitions as their brothers, and seem destined to seek it in equal numbers.

It signifies much to have these and certain kindred questions settled by time and experience—the only way in which they could be settled—and their controversial discussion relegated to the popular pastime of summoning ghosts of the departed.

The debatable questions are really no longer strictly within the educational field. Women now can study what they like and practically where they like. The unsettled questions, such as the academic, scientific and professional opportunities, careers and rewards available to women, especially married women, after the educational period, are of great importance, but they do not fall within the subject of this address.

President Thomas's admirable and inspiring address on the twenty-fifth anniversary of this college, as well as other publications, have made unnecessary the rehearsal on this occasion of all the various influences and policies which have combined to make Bryn Mawr the renowned college which it is to-day. Inasmuch, however, as the highest distinction of this college is the intellectual life which it has cultivated and engendered and the high standards of scholarship which it has created and maintained I may be permitted to recall to your attention certain salient points, familiar as they may be to this audience.

Bryn Mawr entered fully into the heritage of the new ideas and methods introduced in 1876 by the Johns Hopkins University into higher education in this country, marking, as they did, a new era of American university education. I quote President Thomas's own generous words, re-echoed in the introductory remarks to which you have just listened: "Bryn Mawr's debt to Johns Hopkins is too great to be put into words. We owe it not only our group system, but our whole conception of what graduate and undergraduate work should be and our ideals of research and scientific thoroughness." Many times over, I may add, has Bryn Mawr repaid this debt, and most worthily has she guarded to this day these ideals, while adapting and expanding them in detail to meet the special conditions of undergraduate and graduate work of this college in its steady and rapid growth.

It will, I think, be universally conceded, with the fullest and most grateful recognition of the important pioneer work and the later large achievements of her sister colleges, that the entrance of Bryn Mawr into the educational world marked a new epoch in the higher education of women.

The first and most striking evidence of this was the emphasis, previously unexampled in women's colleges, placed by the Bryn Mawr administration in selecting its faculty upon the scholarly attainments and productive scholarship of its teaching staff, and this remains a chief distinction of this college. The excellence of its staff of teachers is the best test of college management and is the foundation of the reputation best worth having of any college or university.

To match the acumen and skill, the flair, one may say, displayed by President Thomas in searching out and securing teachers and investigators whose high promise in the glory of their youth was later realized, one must pass from the academic field to the manifestation of

certain trained senses and qualities in the realms of sport, racing and hunting.

I asked to be supplied with the names of those who have taught here and later attained high distinction. I find, as I anticipated, that the list with the accompanying data is too long to be recited within the limited compass of this address, but it is so remarkable and illustrates so completely the standards of productive scholarship sought for the instructing staff that I can not forbear citing the more eminent names, some of which will be recognized by those unfamiliar with the reputations of technical scholars and men of science.

First in time comes Woodrow Wilson, who soon after receiving the doctor of philosophy degree at Johns Hopkins University and publishing his excellent book on Congressional Government was called to Bryn Mawr in 1885, where he organized the department of history and taught for three years before accepting appointment first at Wesleyan University and then at Princeton. In the same department of history taught for eighteen years Charles McLean Andrews before accepting a call to Johns Hopkins and later to Yale, where he is now Farnum professor of American history.

We can understand one of the reasons for the prominent position held by the ancient classics in the curriculum of Bryn Mawr when we recall that here taught for many years that brilliant Greek scholar, Paul Shorey, who left to head the department of Greek at the University of Chicago; E. Washburn Hopkins, who went to Yale as professor of Sanskrit and comparative philology; Herbert Weir Smyth, here for thirteen years before becoming Eliot professor of Greek literature at Harvard; Gonzales Lodge, for eleven years here and now professor of Latin at Columbia; Tenney Frank, who taught here for fifteen years before he was called to the chair of Latin of Johns Hopkins, and Moses S. Slaughter, who is now head of the department of Latin at the University of Wisconsin.

Indicative of the position accorded to the biological and physical sciences in the scheme of liberal education at Bryn Mawr and if possible even more remarkable than the roll of classical scholars is that of the biologists, which includes the names of Edmund B. Wilson and Thomas Hunt Morgan, now at Columbia, and Jacques Loeb, called here from a docentship at Strassburg and now at the Rockefeller Institute of Medical Research, who are to-day the most eminent biologists of America, perhaps of the world. To these are to be added the well known names of Frederic S. Lee, for many years head of the department of physiology at Columbia, and the chemists, Elmer P. Kohler, who after teaching here for twenty years became professor of chemistry at Harvard, and Edward H. Keiser, now holding the chair of chemistry at Washington University.

I must content myself with merely mentioning some of the familiar names in other departments: in mathematics, Harkness; in geology, Miller; in physics, Mackenzie; in experimental psychology, which he here founded, Cattell; in philosophy, Bakewell and Mezes; in English, Tinker and Upham; in Germanic philology, Collitz; in economics and sociology, Giddings.

When to this impressive list are added the far larger number of women graduates who hold important teaching or administrative positions in educational institutions, including Bryn Mawr herself, we can appreciate something of the richness of the gift contributed by this college in less than four decades of existence through the training and development of teachers and investigators to the education not of women only, but of men as well, and to the advancement of knowledge.

Should any one suppose that this continual migration of eminent men teachers to other colleges and universities has sapped the teaching strength of Bryn Mawr, he has only to regard the eminent women and men in her present faculty and the well equipped departments of instruction in order to realize that never were the educational advantages and the intellectual life of this college so great and so vigorous as they are to-day.

There are, however, certain significant inferences to be derived from the fact that it is mainly men and not women who have been withdrawn from this faculty to other institutions. One of these inferences doubtless points to the preference of many of the men for chairs

in colleges and universities not exclusively for women students. But here an important consideration has also been the inability of Bryn Mawr until recently to compete with better endowed institutions for teachers desired by both. It is amazing that Bryn Mawr has been able to create and to maintain such high academic standards upon an endowment so slender. It is this success which has furnished the strongest possible appeal to her alumnæ and other benefactors of education, who have responded so generously in recent years in increasing her resources. But her needs still are and will continue to be great, and the record of benefits to women's education and thereby to mankind here to be obtained in a measure out of all proportion to the money invested will continue to make its strong, public appeal.

But the most interesting and in many ways the most important conclusion to be drawn from the circumstance that here women teachers stay, whereas so many men leave to join the faculties of other colleges, is that desirable positions in these other colleges and universities, including the coeducational ones, are open to women in so small number as to be practically negligible. This lack of wider recognition of their work by academic promotion deprives women in large measure of one of the most powerful incentives and highest rewards of productive scholarly and scientific work. Among other reasons I find in this situation, which is not likely soon to be remedied, a compelling argument in favor of the existence and generous support of independent women's colleges in spite of the high cost. Unquestionably coeducation is the best solution of the problem of professional and technical education for women, and even for their collegiate training it will continue to be the prevailing system throughout the larger part of this country, particularly in the west, but experience has abundantly demonstrated the need and special services of separate undergraduate colleges for women, and among the most valuable of these services I count the opening of attractive academic careers to women. Bryn Mawr has shown also the value of adding, when it can be properly supported, a graduate philosophical department, meeting especially the needs of prospective teachers and of workers in the field of social economics.

Bryn Mawr from the start laid still further emphasis upon high academic standards and productive scientific work and made an additional important contribution to the educational and research opportunities for women by the establishment of her system of resident fellowships and scholarships, open to graduates of all colleges of good standing, supplemented later by European traveling fellowships and the nine graduate scholarships for foreign women. Thereby the reputation and influence of Bryn Mawr both here and abroad have been greatly increased and extended. The presence of so many graduate students—ninety-two in the academic year now closing—engaged in advanced work has stimulated the intellectual life of the entire college and their example and the opportunities have led many to pursue their studies beyond the college period. There have thus been afforded to members of the faculty welcome opportunities for graduate teaching and the conduct of research which has led to valuable contributions to knowledge.

It is everywhere conceded that the Bryn Mawr degree of doctor of philosophy equals in rank that granted by any university in this country. One has only to examine in the register the lists of the ninety doctors of philosophy and the one hundred and sixty-five masters of arts of Bryn Mawr and to note their names and the positions which they hold or have held, predominantly in the teaching profession, in order to gain some appreciation of the immense service to education rendered by the graduate courses in this college and the system of fellowships and scholarships.

Permit me to quote the fine tribute paid to this feature of Bryn Mawr at the twenty-fifth anniversary by President Taylor of Vassar College, the first in the field of independent women's colleges of truly collegiate standing: "As I have regarded her career with intense interest from the point of view of a fellow worker since her second year, I am disposed to suggest as among her chief contributions, first, the splendid emphasis she has put upon advanced scholarship for women. I think her fine devotion of so large a part of her income to fellowships and scholarships perhaps without parallel in our country. It has been a steadfast devotion, too, untouched by the con-

siderable variations of interest in the educational world that have sometimes forced the question as to the present desire for these great helps to higher scholarship. But Bryn Mawr has been steadfast; never has it yielded an inch of its purpose to offer women the best that can be had. I suggest again the generosity of her welcome to these scholarships of the graduates of other colleges and universities. All over our land there are women graduates of other institutions who owe to this one the encouragement and possibility of their higher attainments. Well may they rise up to-day and call her blessed!"

The president and faculty of Bryn Mawr have worked out with great care and thought a system of liberal training which in its totality as well as in certain special features constitutes a distinct contribution to higher education and is often referred to as the Bryn Mawr type. The essential features are these: a fairly uniform and sound foundation on which to build the college courses secured by the entrance examination in fixed subjects, certificates not being accepted; required courses of study, occupying half of the student's time, in language, letters, philosophy and science, which furnish the essential basis of liberal culture; freedom of choice of other subjects in accordance with the group system, permitting seventy-one combinations of courses; unrestricted elective courses for one sixth of the work, and before graduation evidence by examination of a reading knowledge of French and German (the latter language temporarily replaced during the war by Italian or Spanish).

The group system, so designated for the first time by Miss Thomas, the central feature of this plan, which in recent years has widely replaced the former Harvard system of unrestricted electives, was borrowed in 1885 from the Johns Hopkins University by Bryn Mawr, which, in amplifying and adapting it to the four years' undergraduate college course, has had an important share in its development and spread. This system, while securing on the one hand the definiteness of purpose of the traditional rigid curriculum and on the other the adaptation to the students interests and needs claimed for the free electives, is more than a compromise between these two rival systems, for it has the very real advantage not inherent in either of prolonged thorough training in some one branch of knowledge or group of kindred subjects which appeals to the individual's interest and aptitudes or is preparatory to future professional study, and this without too early over-specialization.

As regards certain modern, controversial tendencies in college education Bryn Mawr has taken a conservative, although by no means narrow position, and President Thomas has defended this attitude and participated in the lively discussions with all of her accustomed vigor, clearness of statement and intensity of conviction.

Bryn Mawr still stands for four years' study of Latin as an obligatory requirement for entrance and for one year's required study of either Latin or Greek in college. Shocking as it may appear to some of our educational reformers, she continues to emphasize the disciplinary and cultural value of the older, traditional subjects—the ancient classics, mathematics, philosophy and history—and the students follow suit in their electives.

That this zealous interest in the older humanities is compatible with the most open hospitality for those modern subjects of study which are considered to have legitimate place in a scheme of liberal education is demonstrated by the ample provision here made for the study of the natural and physical sciences, psychology, modern languages, English language and literature, which is a particularly strong department, long inspired by the teaching of President Thomas herself, the economic, political and social sciences, comparative philology, Semitic languages and literature, classical archeology, history of art, theoretical music, in a form somewhat reminiscent of the position of this subject in the medieval quadrivium, and still other branches of learning.

Even those who may prefer other types of college courses and methods of study will, I think, concede that Bryn Mawr's curricula and standards embody a noble conception of liberal culture and knowledge—a true Studium Generale—retentive of what is good in the older and receptive to what is best in the newer

systems. No adverse financial conditions, no popular clamor and no pressure from outside have led to any sacrifice of quality to quantity, of excellence to numbers, in the maintenance of these ideals.

Modification of the college curriculum to meet the supposed special intellectual needs of women, which has been urged by men more frequently than by women, while it has from the beginning received the serious consideration of educators in women's colleges, has not found favor here or permanently so in other better colleges for women. The ultimate decision of this question rests entirely with the women.

Bryn Mawr resists the transformation of the college of liberal arts by the entrance of strictly vocational and professional studies and frowns upon such heresies as the bisection of the college at the belt line into a junior and a senior college, or the telescoping of the last year or two of the college course into the professional schools. In a word she stands with her sister colleges for preservation of the educational standards and the integrity of the American college in essence and in spirit. To the many who cherish the traditions of the older learning and liberal culture as represented in the American college of the past it may appear that the ark of the covenant is passing into the keeping of the colleges for women.

President Thomas has expressed in these admirable words her conception of the aims of college education for women: "If fifty per cent. of college women are to marry and nearly forty per cent. are to bear and rear children, such women can not conceivably be given an education too broad, too high or too deep, to fit them to become the educated mothers of the future race of men and women to be born of educated parents. Somehow or other such mothers must be made familiar with the great mass of inherited knowledge which is handed on from generation to generation of civilized educated men. They must think straight, judge wisely and reverence truth; and they must teach such clear and wise and reverent thinking to their children." This was fifteen years ago. To-day with the assumption by women of all the responsibilities of citizenship and with the vastly increased influence which college women will exert upon the life of the community and nation, how supremely important it is that the college should aim to discipline intelligence, to strengthen the ability to observe correctly and to form sound intellectual and ethical judgments, and to cultivate for the highest service of the race that fundamental instinct of woman's nature which seeks not less than the perpetuation of the species its safety and welfare!

To this audience it is not necessary to point out that the brilliantly successful efforts of President Thomas to bring to realization at Bryn Mawr certain clear and well defined conceptions of the place and functions of the college in education, as distinct from the secondary school on the one hand and graduate, professional and technical schools on the other, imply no lack of interest in providing opportunities for the training of women in practical and vocational subjects in their proper place. Quite the contrary is of course true.

Full evidence of this is found here at Bryn Mawr in the excellent provisions for the training of teachers and specialists in the graduate courses, particularly in the Graduate Department of Education, an integral part of which is the Phœbe Anna Thorne model school with its primary, elementary and secondary departments, and in the Carola Woerishoffer Graduate Department of Social Economy and Social Research with its admirably conceived theoretical and practical courses which furnish much needed opportunities for training women for ever widening useful and attractive careers in the immense fields of organized social, industrial and community activities and welfare, for which women are much better fitted than men.

What could make stronger appeal to human sympathy and generous support than the novel and interesting experiment, successfully launched here last summer and to be continued this one, of the Summer School for Women Workers in Industry, conceived and initiated by President Thomas?

Our Medical School at the Johns Hopkins and all women owe an inexpressible debt of gratitude to the vigorous efforts and persuasive arguments of Miss Thomas and the generous donation of Miss Mary Garrett in securing the Women's Endowment Fund which enabled the

school to start in 1893 with its doors open to the admission of women upon the same conditions as for men, the blessing of coeducation in medicine being more adequately appreciated to-day than at that time. This is only one of the many large services to the women's cause rendered by President Thomas outside of Bryn Mawr College.

To that very important if not larger part of college education which is represented by students' life, association in college halls of residence and activities, here fortunately without intercollegiate athletics, clubs and fraternities, and without sacrifice of the primary collegiate aim, and which really creates the spirit and personality of the college, Bryn Mawr has made its full and delightful contribution, but this is for those who have lived the life to tell. Most charmingly and competently has this been done by the pen of a gifted alumna, Mrs. Helen Thomas Flexner, in the brochure entitled "Bryn Mawr—a Characterisation."

I may mention as a most notable contribution affecting the life of students the system of students' self-government, which was developed here in a more completely organized and unrestricted form than existed elsewhere. It "was born," President Thomas tells us, "of the temporary and wholly fortuitous coming together of marriageable men and maidens as professors and students."

We have only to look around us on these lovely grounds and beautiful buildings of grey stone in order to appreciate the significance of the contribution made under the directing mind and taste of President Thomas by Bryn Mawr's architects to the beauty of American colleges in creating here what has been designated as the American Collegiate Gothic style of architecture.

The best fruits of all the contributions of Bryn Mawr which I have sketched so incompletely and inadequately and of the inspiring personal influence and instruction of President Thomas are the lives and work of over 4,500 former and present students, of whom about 2,000 are alumnæ, of this college.

Who can estimate the benefits to American homes and communities, indeed to the whole nation, resulting from the activities and influence of these women who received their inspiration and training within these walls? Members of the graduating class! We have every confidence that these benefits are to be appreciably increased by your admission to-day to the goodly company of liberally educated women who bear forth to the world the spirit and the traditions of service of Bryn Mawr.

President Thomas! It is a great privilege and honor for me, personally and as a representative of the Johns Hopkins University, to be permitted to join with these loyal alumnæ of Bryn Mawr and your colleagues and with hosts of others in paying tribute to you on this occasion for your great and enduring work for this college, which, as I have endeavored to point out, has made important contributions to higher education. It was not really necessary to add the last two words to the title of this address.

You brought to this task, so triumphantly achieved, scholarly attainments and unswerving devotion to productive scholarship, force of character and intellectual ability of a high order, the boundless energy and enthusiasm of abiding youth, indomitable courage, resourcefulness and perseverance in overcoming difficulties, clear vision and steadfast loyalty to ideals, persuasive and vigorous speech, the inspiration of a cultured, radiant and vital personality, an unwavering and ardent devotion to the cause not of woman's education only but of her advancement in all ways and her emancipation from all shackles and disabilities.

In enjoying well earned release from the burdens of administrative responsibility and in turning to other tasks, for we can not think of you as inactive, you carry with you the durable satisfaction of great service rendered to the great cause to which you have devoted your life, the admiration, affection and gratitude of the thousands of students, alumnæ and friends of Bryn Mawr College, the appreciative recognition and felicitations of other institutions of learning, of scholars and of friends of education and of the cause of women everywhere.

We can hardly think of Bryn Mawr without you, President Thomas, but you are passing on to an able and experienced successor, a threefold graduate of this college, the torch of un-

quenchable flame which here you have kindled and which here will burn brighter and ever brighter in the coming years to illumine the path of women toward knowledge and wisdom, toward the attainment of the largest and best use of their intellectual and spiritual powers, toward appreciation and enjoyment of the best in life, in literature, in art, in science, in men and women, toward understanding and furthering of the agencies and forces which make for righteousness, peace and the betterment of mankind.

WILLIAM H. WELCH
THE JOHNS HOPKINS UNIVERSITY

"THE FRIENDLY ARCTIC"

(Published by permission of the Deputy Minister of Mines, Ottawa).

ANY one who is in the slightest degree familiar with the Arctic, or even with the history of Arctic expeditions, must have been amazed at the naïve review of Mr. Stefansson's book, "The Friendly Arctic," that appeared in the March 24 issue of SCIENCE for the current year. The writer of that review, Professor Raymond Pearl, admits that he is "in no wise a specialist in either geography or polar exploration." One may be permitted to wonder why he undertook the task of reviewing a book that is mainly concerned with those topics. His review, indeed, would be unworthy of serious notice were it not for the wide circulation of the journal in which it appeared; but on that account a reply seems called for.

The reviewer states that the importance which the history of science will attach to Mr. Stefansson's work will rest primarily on his application of a "new and strictly scientific method" to the problem of Arctic exploration; for, whereas earlier explorers depended for food, heat, shelter and clothing mainly on the supplies which they took in with them, Mr. Stefansson, acting on scientific principles, "carried through, over a long period of time [nearly five years, we are told in another place] and a wide range of area, travels in the polar regions, living entirely off the country as the Eskimos do."

Now this statement is unjust not only to earlier explorers, but to Mr. Stefansson himself. The practice of living off the country is *not* a new one in polar exploration. To quote but one example: Dr. John Rae, in 1846-7, supported himself and his party for a whole winter in Repulse Bay, although their only weapons were old, muzzle-loading guns. The method is really a very satisfactory one for a quickly-moving traveler who can choose his own hunting-grounds (*e. g.*, David Hanbury in 1902), and even for a small stationary party in certain well-favored regions; it is rarely satisfactory in the case of a large party working for any length of time within a prescribed area, because the game supply rapidly becomes exhausted. Hence the necessity for bases, and caches of food, employed not only by both the northern and southern parties of the Canadian Arctic Expedition, but by all polar expeditions. Every reader of Arctic literature knows that while game may be plentiful in certain places and at certain seasons, it is very scarce in other places and at other times of the year. All explorers, therefore, including Mr. Stefansson, have been careful to take supplies with them whenever possible, whether they are traveling by ship or by sled, in order to have something to fall back upon when the local supply of game fails. To do otherwise would be the sheerest folly. To take an example. One of the almost gameless areas in the north at the present time is the long stretch of coast between Barrow and the mouth of the Mackenzie River during the winter months; caribou are exceedingly scarce in this region and seals difficult to procure except in the spring and summer. Mr. Stefansson, during his last expedition, spent nearly a year in this portion of the Arctic, but, despite his reviewer, he does *not* claim to have lived off the country at this time, or even to have attempted to do so. He will probably himself admit that from September, 1913, when he first landed from his ship, the Karluk, until March, 1914, when he started on his ice trip, his rifle did not secure him a single meal. Similarly, on his exploration trips in the northern archipelago, where game is more plentiful than in most places, he prudently carried on his sleds all the supplies he

could, as is shown by his statement of what he intended to carry on his *second* ice journey in 1915:[1]

I shall start about Feb. 15 with 2 sleds and 3 men beside myself . . . Fortunately our dog-feed is ready where we dried it at Norway Island—it will be dried caribou meat, caribou fat and blubber. *Our own grub will be chiefly rice, fat and sugar. We also have 50 pounds of malted milk, 50 pounds pea-meal and over 200 pounds pemmican . . .*[2]

The reviewer, being absolutely ignorant of the true conditions of polar travel, has uncritically taken certain general statements made by Mr. Stefansson about his living off the country and its advantages as an actual fact that occurred, not merely at certain times and in certain places, but invariably throughout the whole five years of the expedition. Mr. Stefansson, with better knowledge of the conditions that he would be called upon to face, wisely provided himself with three vessels loaded with all the necessary supplies of pemmican, sugar, rice and other foods.

There is also another side to this question of living off the country which seems totally unknown to the reviewer. It involves the destruction of entire herds of caribou and musk-oxen, males, females and young. On Melville Island, one of the largest islands in the north where musk-oxen are still found, Mr. Stefansson and his companions killed, on their own estimate, about one tenth of the total number of musk-oxen (400 out of an estimated 4,000).[3] One can easily imagine how long the supply of game would last under these conditions. The musk-oxen have already been almost exterminated on the mainland of America and in Greenland; on Victoria and Banks Islands they were destroyed by the Eskimos prior to 1913, and the only places where they still remain in any numbers are Ellesmere Island and a few smaller islands adjacent to it. The caribou too have seriously diminished in numbers; their extinction around Coronation Gulf is well within sight even now, although in 1913 they could be counted there by thousands.

The cautious reader, then, will hardly accept the reviewer's extravagant claims for this so-called "new and strictly scientific method" of polar exploration. Another of his statements, equally false, demands more serious attention. He says:

In point of fact a considerable number of the members of his [Mr. Stefansson's] expedition, logically excogitated the matter and came to the conclusion that in holding such views [*i. e.*, feasibility of living off the country] Stefansson was not merely silly but probably also insane, and in consequence felt justified in (*a*) disobeying his orders as commander of the expedition, (*b*) in refusing to render him any aid (*cf.* pp. 114-115 regarding chronometers), and (*c*) in actively hindering his preparations and subsequent operations.

Now no really scientific man would endorse unsubstantiated charges without considering whether there might not be another side to the question. A few official documents will show that there is another side. The three principal charges made by Mr. Stefansson in his book are:

Charge I.—Attempted mutiny, insubordination and disobedience at Collinson Point, 1914. Dr. Anderson, it is alleged, refused to supply the stores and equipment necessary for Mr. Stefansson's ice trip, and the topographers deliberately withheld chronometers that he needed ("The Friendly Arctic," Ch. XII).

The official orders issued to Mr. Stefansson by the Department of Naval Service before the expedition left Esquimalt, B. C., in 1913, read as follows:[4]

The first party, headed by yourself, will explore the Beaufort Sea, and the unknown waters in that vicinity. The second party, under the direction of Dr. Anderson, will busy itself with the scientific work in the extreme northern land of Canada . . .

[1] Copy of letter on file at the Department of Mines, Ottawa.

[2] The italics here and elsewhere are mine. The pemmican was the Underwood man pemmican. From the amount Mr. Stefansson carried with him on this occasion he must have rated its food value somewhat higher than would appear from his book (See "The Friendly Arctic," pp. 718f.).

[3] Testimony of S. T. Storkerson before the Royal Commission appointed May 20, 1919, to Investigate the Possibilities of the Reindeer and Musk-ox Industries in the Arctic and Sub-Arctic Regions of Canada.

[4] Copy of orders on file at the Department of Mines, Ottawa.

The relative importance for this party is as follows: (1) geological, (2) geographical, (3) anthropological, (4) biological, (5) photographical. *The chief of the Southern Party, as executive head, must afford every facility as circumstances permit to enable these sub-parties to carry out the above important work.*

The Summary Report of the Geological Survey of Canada for 1913 contains the following statement by the director (p. 9):

Scientific work within the scope of the Geological Survey was placed *under the jurisdiction of the Survey.* The expedition was divided into two parties, the northern exploration party under Mr. V. Stefansson, the leader of the expedition, and a southern scientific party under Dr. R. M. Anderson of the Geological Survey, whose field of operation was to be in the neighborhood of Coronation Gulf, Coppermine River and Victoria Land. [After naming the officials of the Survey who were on this southern party the director continues:] *The officers of the Survey are working under the direction of and reporting to the Geological Survey.*

From these official documents it is clear, (*a*) that the Southern Party was working on a definite program outlined by the Geological Survey, and (*b*) that its leader, Dr. Anderson, was responsible for providing it with all the necessary facilities in the way of food supplies, sleds, dogs, etc.

The old whaling steamer Karluk, which was to be used by Mr. Stefansson for his northern explorations, was caught in the ice in August, 1913, carried away towards the coast of Siberia and crushed in the following January. It had carried not only the whole of the Northern Party and its outfit, but much of the outfit of the Southern Party as well. The former was competely broken up by its loss, while the Southern Party, though nearly intact as far as personnel was concerned, was left inadequately equipped for its work in Coronation Gulf. Dr. Anderson, its leader, holding himself responsible for the carrying out of that work in accordance with the government instructions, refused to cripple his party any further for the sake of Mr. Stefansson's ice trip, or the formation of a new northern party. The topographers, for their part, were faced with two alternatives by Mr. Stefansson's demand for their chronometers; they could either hand them over, leave the expedition and return at once to Ottawa (for without their chronometers they could do nothing) or else refuse to give them up and proceed to carry out their work as originally planned. In view of the fact that their department had attached them to the expedition solely for the work in Coronation Gulf and had issued precise and detailed instructions to them concerning it, the topographers decided that it was their duty to retain their chronometers and carry out the orders of their department to the best of their ability. The question at issue was *not,* as both Mr. Stefansson and his reviewer state, whether the members of the Southern Party accepted Mr. Stefansson's views about living off the country (land or ice), or considered them "silly and insane," but whether the work outlined for the Southern Party was to be seriously curtailed in order to equip Mr. Stefansson's new party with scientific instruments, large quantities of condensed provisions and other supplies. Had the Southern Party consented, it could not have carried out its own program. The government sustained its action on receiving the full reports; even before their receipt it sent the following despatch, which reached Herschel Island in July, 1914:[5]

Department of the Naval Service,
Ottawa, 30th April, 1914.

V. Stefansson, Esq., Commander, Canadian Arctic Expedition (Northern Division), Herschel Island, via Athabasca Landing.

Sir:

With reference to the plans for a northern expedition during the coming summer

I have discussed with Mr. Brock[6] your suggestions for the movements of the men and ships this summer and the matter has been submitted to the minister with result that it has been decided that, should the Karluk and the men on board not be available for work this spring, it will mean that you will find yourself with the southern party practically intact and with two small vessels besides the motor launch and smaller boats. Under these circumstances it is considered that it would not be wise to break up the Southern Party and take some of its members for northern exploration.

[5] Copy on file at Department of Mines, Ottawa.

[6] R. W. Brock, then deputy minister of mines. See "The Friendly Arctic," p. 380.

Such a division of forces would probably defeat the object of sending out the Southern Party by weakening it and the results to be obtained by the exploration of Banks Land and Prince Patrick Island would not compensate for the sacrifice.

It has therefore been decided that the Southern Party should as far as possible be kept intact and that the program laid out for it should be carried out as far as circumstances will admit.

Your proposal that you should lead a northern party along the coasts of Banks Land and Prince Patrick Island is approved and you are authorized to engage the men of whom you spoke as being available for this expedition. Details of the arrangement must necessarily be left to you and will depend largely on developments in the Arctic regions. *But the main point to be borne in mind is that the work of the Southern Party should be carried out as originally proposed and that it should not be weakened for the purpose of organizing another northern party.*

Yours truly,
(Signed) G. J. DESBARATS,
Deputy Minister

Charge 2.—Dr. Anderson, the leader of the Southern Party, is accused of failing to forward to the government a copy of a very important letter of instructions from Mr. Stefansson outlining his plans and projected movements during and after his ice-trip of 1914 and to inform the press of Mr. Stefansson's movements ("The Friendly Arctic," p. 382).

Mr. Stefansson is clearly in error. Dr. Anderson forwarded copies of this letter by the first mail to the Department of the Naval Service and to the Geological Survey, Department of Mines. The copy sent to the Department of Mines is still on file in that department; that sent to the Naval Service was acknowledged by the deputy minister of the Naval Service, a copy of which acknowledgment is also on file in the Department of Mines.[7]

Charge 3.—Dr. Anderson is accused of disobedience in the summer of 1914 because he failed to send the schooner *North Star* to Banks Island, as ordered by Mr. Stefansson. The *North Star*, Mr. Stefansson states, was bought especially for the explorations around Banks Island, the schooner which was actually sent there, the *Mary Sachs*, being unsuitable for the work ("The Friendly Arctic," pp. 271-2).

Now on March 10, 1914, six days before setting out on his northern explorations and nearly three months after the purchase of the *North Star* ("The Friendly Arctic," p. 103), Mr. Stefansson gave the following instructions to Dr. Anderson:[8]

The work of the *Mary Sachs* as planned at present has two main objects—(1) the carrying forward so far as resources permit of the scientific and exploratory work of the *Karluk* and (2) establishing beacons and depots along the west coasts of Banks and Prince Patrick Islands against the possible landing there of either shipwrecked men or exploration parties from the *Karluk* . . .

A supply depot for the Southern Party shall be established from a portion of the supplies bought from M. Anderson [a local trader]. The *North Star* shall take these to some place agreed upon that is uninhabited and therefore safe—probably Liston Island—and leave them there to be picked up later by the *Alaska*. After that the *North Star* shall go about work later to be decided upon —probably either oceanography or establishing a depot on the west coast of Banks Island for the *Sachs* or against the possible arrival there of men from the *Karluk*.

Evidently Mr. Stefansson at this date considered the *North Star* less suitable than the *Mary Sachs* for his northern explorations. This is hard to reconcile with his statement ("The Friendly Arctic," p. 272) that "the *Star* was purchased especially for the Banks Island trip and the *Sachs*, through her twin propellers, was particularly badly suited to those more northerly and icy waters."

In his later instructions ("The Friendly Arctic," p. 158; the letter is dated April 6) Mr. Stefansson ordered both the *North Star* and the *Mary Sachs* to proceed to Banks Island. Dr. Anderson sent the *Mary Sachs* alone with a launch, for the following reasons:

(*a*) One of these schooners was required to carry the supplies of the Southern Party to Coronation Gulf. Mr. Stefansson had already issued orders to this effect.

(*b*) The *Mary Sachs* was the larger vessel, and Mr. Stefansson's original choice.

[7] See also Dr. Anderson's despatches to *N. Y. Times;* of May 16, 1914, published September 1; August 21, published September 23; and September 14, published March 5, 1915.

[8] Copy of letter on file in the Department of Mines, Ottawa.

(*c*) The *Mary Sachs* was sanctioned by the government for the Banks Island work, the *North Star* was not. [A copy of the instructions sanctioning the *Mary Sachs*, dated Ottawa, 5th May, 1914, is on file in the Department of Mines.]

(*d*) News of the *Karluk's* crew having reached Wrangell Island made provision for them on Banks Island unnecessary.

(*e*) Where orders were too contradictory to be reconciled, it was considered more ethical to follow out the carefully considered plans of the government.

The reviewer of Mr. Stefansson's book was unaware, of course, of all these documents; but a sense of justice and the exercise of a little critical acumen should have saved him from accepting Mr. Stefansson's charges at their face value. The real value to be placed on them, as well as on other statements made by Mr. Stefansson, the reader can determine for himself in the light of the documents quoted above.

D. JENNESS

VICTORIA MEMORIAL MUSEUM,
OTTAWA

SCIENTIFIC EVENTS

PASTEUR AS DRAMA[1]

Pasteur is the title of the play with which M. Lucien Guitry, the eminent French actor, has this week opened his repertory season in London. The piece, which was played last year in London on a few occasions by M. Guitry, was first produced in Paris in 1919. It no doubt owes something to the successful production in this country of *Abraham Lincoln*, for both plays depict a great man in selected scenes at different periods of his life. The author of *Pasteur* is M. Sacha Guitry, son of the actor, who admittedly found his inspiration in Vallery-Radot's biography of Pasteur, and designed the play especially to suit the talents of his distinguished father. The first act shows Pasteur in his study with his pupils at the outbreak of the war of 1870. In the second act there is a moving representation of a meeting of the Academy of Medicine, where Pasteur vigorously combats an attack upon his theories, in this scene the audience plays the part of the members of the Academy, with one or two actors speaking from the stalls. In the third act the boy Joseph Meister, who has been bitten by a mad dog, is brought to be inoculated by Pasteur, who sends for a doctor to perform the inoculation, for Pasteur himself held no medical qualification. The dramatist shows his art at the close of this act, for Pasteur, although he knows he can give no help, stays on all night in case something unexpected may happen. The scene changes in the fourth act to Pasteur's home in the country, where he is ill and on the verge of a breakdown; his friend the doctor tries to persuade him to take a rest, but Pasteur is deeply engaged in the study of epilepsy and cannot tear himself away. To him comes again Joseph Meister, now a youth, and a delightfully sympathetic scene ensues between the two. The last act is the crown of Pasteur's career, his reception by the president of the republic in the amphitheater of the Sorbonne, crowded by his friends, among whom is Lister, whose name is announced, although he does not actually appear on the scene. The play has no "love interest" and no female character, and follows no dramatic rules; it is practically a series of monologues, in which the actual words of Pasteur are often used, and its only unity is in the portrayal of its chief character. It is a triumph for M. Lucien Guitry, who appears to live the part of the simple, unaffected, kindly man of genius.

[1] From the *British Medical Journal*.

FOREIGN STUDENTS AND THE FEDERAL IMMIGRATION LAWS

EXEMPTION of bona fide foreign students from the operation of the present immigration law is urged in a resolution adopted recently by the executive committee of the American Association of University Professors. The resolution states:

Whereas, The omission to exempt bona fide students desirous of entering American institutions of learning from the operation of the present immigration law is probably due to inadvertence, inasmuch as such students are expressly exempted from the operation of the Chinese exclusion act and the agreement with Japan;

Whereas, the actual operation of the immigration law has been attended with such deplorable annoyance to incoming students as to lower the prestige of the United States as a center of education;

Be it resolved, That Congress be petitioned to amend the existing three per cent. immigration act by exempting from its provisions all bona fide students.

Be it further resolved, That in case such amendment be not made effective before September 1, 1922, the government be petitioned to cause the adoption by the Bureau of Immigration of such administrative rulings as will preclude the possibility of incoming students being sent to Ellis Island or other detention stations.

TEXTILE RESEARCH INSTITUTE[1]

IN the hearings before the Senate committee investigating dyes, the statement was made that there remain to be invested in education and research several hundred thousand dollars representing the profits of the Textile Alliance, in accordance with the original understanding with the State Department.

We urge that this fund be devoted to the establishment of an American Textile Research Institute. Notwithstanding the work of government bureaus, private corporations, and textile schools, there are concerted efforts abroad which surpass anything we have to offer. As an industry, textile manufacturers have not yet been convinced that they can conduct research as an association enterprise. We believe that unless the present opportunity is utilized it may be many years before adequate work will be supported here.

A simple effective plan can be devised. Cotton, wool, linen and silk should be represented in the institute. There are strong trade associations representing these fibers. There is a splendid association of finishers, and still other groups of spinners, dyers, dry cleaners, laundrymen, and other crafts directly concerned with textiles. From these groups a strong advisory committee can be formed and by utilizing the income from the fund to be available a deal of important work can be carried on in existing laboratories throughout the country. The initial staff of the institute could consist of a director with proper assistants, and if desirable an early activity could be the establishment of informational service and a statistical bureau and a proper medium for broadcasting new information.

To divide the capital sum among those now interested in textile research seems to us unwise, for provision should be made for study of new problems as they may arise in whatever laboratory may be best fitted for the investigation. By keeping the present sum as a fund other money is sure to be attracted, and there would be available annually a sum which under wise administration would eventually bring to the laboratories far greater support.

Plans should be perfected, and it is our hope that the committee appointed by the Textile Alliance to consider and recommend methods for the employment of the money in hand may decide upon some such program as we have here suggested.

[1] From the *Journal of Industrial and Engineering Chemistry*.

THE CHEMICAL FOUNDATION

PRESIDENT HARDING on July 1 addressed the following letter to Colonel Thomas W. Miller, the alien property custodian:

My attention has been called by the Department of Justice to the fact that a corporation known as the Chemical Foundation has brought suit against the treasurer of the United States and certain licensees of the Federal Trade Commission for an accounting alleged to be due the said Chemical Foundation on royalties due it for the use of certain patents originally seized under the authority of the alien property custodian and sold to the Chemical Foundation by the custodian during the previous administration. On the face of such an action it became so apparent to me that an inquiry should be made that I asked for a report by the Department of Justice on the sale of this enemy property to the Chemical Foundation. It appears that the sale was made at so nearly a nominal sum that there is reason to believe that this government has not faithfully observed the trust which was implied in the seizure of this property. The circumstances relating to the entire transaction are of such a character that full investigation becomes a public duty. Moreover, I feel that your office is obligated to maintain the sacred character of the trust to which the alien property custodian is committed by the law.

You are therefore directed to forthwith proceed as follows:

1. Make written demand upon the Chemical

Foundation, Inc., in form to be approved by the attorney general, to immediately return, transfer and assign to the alien property custodian, all patents, trademarks, copyrights, contracts, applications or other properties or rights transferred to it by the alien property custodian as aforesaid, and to account to you for any and all rents, profits, license fees, or other proceeds thereof realized by said Chemical Foundation, Inc., from said properties, or rights or any of them from the date of transfer thereof to the Chemical Foundation, Inc., to the date of restitution.

2. Take any other action which may be advised or approved by the attorney general, by suit or otherwise, to fully and in every respect protect the rights or interests of the United States and any other person or corporation interested therein, in and to the properties and rights aforesaid, and any proceeds, income or profits therefrom in the hands of the Chemical Foundation, Inc., or its officers, agents or employees.

In carrying out these instructions you will act upon the advice of the attorney general.

THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH

THE Board of Scientific Directors of the Rockefeller Institute for Medical Research announces the following promotions, appointments and other changes:

Dr. Wade H. Brown, hitherto an associate member in pathology and bacteriology, has been made a member.

Dr. Homer F. Swift, hitherto an associate member in the department of the hospital, has been made a member.

Dr. Carl A. L. Binger, hitherto an assistant in the department of the hospital, has been made an associate.

Dr. Albert H. Ebeling, hitherto an assistant in experimental surgery, has been made an associate.

Dr. Laura Florence, hitherto an assistant in the department of animal pathology, has been made an associate.

Dr. Albert B. Hastings, hitherto an assistant in the department of the hospital, has been made an associate.

Dr. Philip D. McMaster, hitherto an assistant in pathology and bacteriology, has been made an associate.

Dr. Louis A. Milkeska, hitherto an assistant in chemistry, has been made an associate.

Dr. Ida P. Rolf, hitherto an assistant in chemistry, has been made an associate.

Mr. Fred A. Taylor, hitherto an assistant in chemistry, has been made an associate.

Dr. Hugh J. Morgan, in the department of the hospital, has been appointed resident physician at the hospital.

Dr. David I. Hitchcock, hitherto a fellow in general physiology, has been made an assistant.

Mr. James M. Neill, hitherto a fellow in the department of the hospital, has been made an assistant.

Mr. Henry S. Simms, hitherto a fellow in chemistry, has been made an assistant.

The following new appointments have been made:

Professor Karl Landsteiner, member in pathology and bacteriology.

Dr. Christian Lundsgaard, associate in the department of the hospital.

Dr. Thomas M. Rivers, associate in the department of the hospital.

Miss Lillian E. Baker, chemical assistant in the division of experimental surgery.

Dr. Edmund A. G. Branch, assistant in the department of the hospital.

Dr. George R. Brow, assistant in medicine and assistant resident in the hospital.

Dr. Harry W. Dahl, assistant in medicine and assistant resident in the hospital.

Dr. Douglas R. Drury, assistant in pathology and bacteriology.

Dr. Geoffrey C. Linder, assistant in medicine and assistant resident in the hospital.

Dr. Henry A. Murray, Jr., assistant in the department of the hospital.

Mr. Fredric M. Nicholson, assistant in pathology and bacteriology.

Miss Ida W. Pritchett, assistant in pathology and bacteriology.

Dr. Harold A. Salvesen, assistant in medicine and assistant resident in the hospital.

Dr. Harold J. Stewart, assistant in medicine and assistant resident in the hospital.

Dr. Chester M. Van Allen, assistant in pathology and bacteriology.

Miss Helena A. M. Tibbetts, fellow in the department of animal pathology.

Changes in position have taken place as follows:

Dr. Harold L. Amoss, hitherto an associate member in pathology and bacteriology, has accepted a position as associate professor of medicine at Johns Hopkins Medical School.

Dr. Lloyd D. Felton, hitherto an associate in

pathology and bacteriology, has accepted a position as assistant professor in preventive medicine at the Harvard Medical School.

Dr. Raymond G. Hussey, hitherto an associate in bio-physics, has accepted a position as assistant professor in pathology in Cornell University Medical College.

Dr. Robert L. Levy, hitherto an associate in the department of the hospital, has accepted a position as associate in medicine at the College of Physicians and Surgeons, Columbia University, and assistant visiting physician at the Presbyterian Hospital.

Dr. Edgar Stillman, hitherto an associate in the department of the hospital, has accepted a position as associate in medicine at the College of Physicians and Surgeons, Columbia University, and assistant visiting physician at the Presbyterian Hospital.

Dr. Goronwy O. Broun, hitherto an assistant in pathology and bacteriology, has accepted a position as assistant in the Thorndyke Laboratory, Boston, Mass., and assistant resident physician at the Boston City Hospital.

SCIENTIFIC NOTES AND NEWS

ALFRED GOLDSBOROUGH MAYOR, director of the department of marine biology of the Carnegie Institution, died on June 25, at Key West, Fla., aged fifty-four years.

PRINCE ALBERT DE MONACO, distinguished for his oceanographic studies, died in Paris on June 27, at the age of seventy-four years.

DR. F. G. COTTRELL has been appointed director of the Fixed Nitrogen Research Laboratory. He succeeds Dr. Richard C. Tolman, who goes, as has been already announced, to the California Institute of Technology.

THE Albert Medal of the Royal Society of Arts for 1922 has been awarded by the council to Sir Dugald Clerk, in recognition of his important contributions, both theoretical and practical, to the development of the internal combustion engine.

THE John Fritz medal has been presented by the board representing the leading engineering societies to Senator Guglielmo Marconi. The medal is presented for achievement in applied science as a memorial to John Fritz, who was the first recipient. Other recipients of the medal have been Lord Kelvin, George Westinghouse, Alexander Graham Bell, Thomas Alva Edison, Charles T. Porter, Alfred Noble, Sir William Henry White, Robert W. Hunt, John Edison Sweet, James Douglas, Elihu Thomson, Henry Marion Howe, J. Waldo Smith, George W. Goethals and Orville Wright.

JOHN LYLE HARRINGTON of Kansas City, Mo., has been nominated as president of the American Society of Mechanical Engineers, succeeding Dean Dexter S. Kimball, formerly of the Cornell University College of Engineering. The newly nominated vice presidents of the society are: W. S. Finlay, vice president of the American Water Works and Electric Company, New York; William H. Kenerson, professor of mechanical engineering, Brown University; Earl F. Scott, Atlanta, Ga.; H. H. Vaughan, Montreal.

ON June 4, at the special invitation of the governors and the medical school, Professor Harvey Cushing took over the directorship of the surgical unit of St. Bartholomew's Hospital and replaced the director, Mr. Gask for ten days. The compliment was, as it were, a return for a like compliment paid to Mr. Gask last year, when he acted as temporary chief of the Peter Brigham Bent Hospital, Boston, to which Dr. Harvey Cushing as professor of surgery at Harvard is surgeon.

THE honorary degree of Doctor of Laws was conferred by Wesleyan University on June 19 on Dr. John Campbell Merriam, president of the Carnegie Institution of Washington.

AMHERST COLLEGE at the recent commencement conferred the degree of doctor of science on Dr. Walter W. Palmer, a graduate in the class of 1905, professor of medicine in Columbia University.

MR. GEORGE ROCKWELL PUTNAM, commissioner of lighthouses, U. S. Lighthouse Service, received the honorary degree of doctor of science at the fiftieth commencement of Stevens Institute of Technology.

A LARGE meeting was held at the Sorbonne on June 14 to do honor to M. Camille Flammarion, the astronomer, who celebrated his eightieth birthday. M. Paul Painlevé, of the Institute,

lectured on "Man and the signs of the heavens." M. C. E. Guillaume followed on "The work of Flammarion." Distinguished artists of the Comédie Française read extracts from Flammarion's works, and astronomical photographs were thrown on the screen.

PROFESSOR HERBERT F. MOORE, professor of engineering materials at the University of Illinois, received the degree of doctor of science at the commencement of the New Hampshire College.

THE following geographers were elected honorary members of the Hungarian Geographical Society at its fiftieth anniversary meeting in Budapest in May, 1922: MM. de Margerie (Paris), Mackinder (Oxford), Hellmann (Berlin), Beltran y Rozpide (Madrid), Machatschek (Prague), Marinelli (Florence), Lawrence Martin (Washington), and the presidents of the Spanish and Italian geographical societies.

DR. WILLIAM LIBBEY, professor of physical geography at Princeton University, and M. S. S. Smith, professor of civil engineering, have retired with the title of professor emeritus.

DR. JOHN LORENZO HEFFRON resigned as dean of the Syracuse University School of Medicine on June 15. This resignation terminates the connection which Dr. Heffron has held with the teaching staff of the medical school for forty years, during fifteen of which he has served as dean. Dr. Heffron was made dean emeritus.

MR. HUBERT VICKERY, Ph.D. (Yale '22), has been appointed research assistant in biochemistry in the laboratory of Dr. Thomas B. Osborne, Connecticutt Agricultural Experiment Station, New Haven.

PROFESSOR T. H. GOODSPEED, of the University of California, is at present working at the University of Oxford, and will spend the latter part of the summer at the John Innes Horticultural Institution at Merton, Surrey.

DR. WALTER L. BIERRING, Des Moines, sailed for Scotland on June 27, to attend the ceremony of his election as an honorary member of the Royal College of Physicians, Edinburgh.

PROFESSOR ADOLPH E. WALLER of the Ohio State University, will devote the current season to the further study of economic botany in Europe, later returning to America via England in time to attend the annual meeting of the Britiesh Association.

MR. FRANK C. BAKER, curator of the Museum of Natural History, University of Illinois, will spend the summer in Wisconsin, continuing his study of the molluscan fauna of that state for the Geological and Natural History Survey.

THE twelfth season for the Laguna Marine Laboratory of Pomona College began on June 21. The summer school will last six weeks. There are the usual courses in zoology and marine biology, with eight private rooms for investigators. As in the past ten years the work is under the charge of Dr. W. A. Hilton.

THE new plant breeding station and chemical laboratories established in connection with the agricultural department of the University College of Wales, Aberystwyth, were formally opened on May 20. The station has been made possible by the endowment provided by Sir Laurence Philipps, who, in addition, will for ten years contribute a substantial sum towards the annual cost of the farm of ninety-two acres.

As reported in the *Journal* of the American Medical Association, the new laboratory building, erected by the Harvard Cancer Commission for the study of cancer and biophysics in Boston, was opened recently with appropriate exercises, in the amphitheater of the Harvard Medical School. This building adjoins the Huntingdon Memorial Hospital and will be known as the John Collins Warren Laboratory, in recognition of the services rendered to the university by Dr. Warren, former chairman of the cancer commission. In the basement of the new building a vault for the storage of the commission's radium is provided, together with the necessary pumps and apparatus for collecting and purifying the gaseous emanation from the radium solution. The first floor contains the reception and examination rooms for outpatients, together with the Roentgen ray laboratory for Professor Duane. Free diagnosis service will be maintained by the State Department of Health, under the supervision of Dr.

James H. Wright. Material removed at surgical operations can be sent to the laboratory by any registered physician in Massachusetts, and a pathologic examination of the tissue will be made, with a report as to its nature, and returned without expense to the physician or his patient. Dr. Henry P. Wolcott, chairman of the cancer commission, and Dean David L. Edsall, of the Harvard Medical School, who was the presiding officer, gave addresses at the ceremony.

WE learn from *Nature* that a prize of $5,000 is offered by Mr. Frank J. D. Barnjum of Montreal for a practical method of combating and suppressing the spruce bud worm, bark beetle and borer, which have caused such tremendous damage in the forests of Eastern Canada and the United States. The Province of Quebec alone has suffered a loss during the past ten years of 150,000,000 cords of standing pulpwood by these pests, which represents a market value in pulpwood of three billion dollars, or if manufactured into paper, of seven billion dollars. This represents a loss of wood sufficient for forty-five years' requirements for newsprint for the North American continent. The competition will close on August 1, and the $5,000 will be given for the successful suggestion that is accepted by the judges, who will be Sir William Price of Messrs. Price Bros., Quebec; Dr. C. D. Howe, dean of the faculty of forestry, Toronto University; Mr. Fred A. Gilbert, Great Northern Paper Company, Bangor, Maine; Mr. G. C. Piche, chief of forest service, Quebec, and Mr. Ellwood Wilson, Laurentide Company, Grand Mere, Quebec. Competitive suggestions should reach Mr. Frank D. J. Barnjum, New Birks Building, Montreal, Canada, before August 1.

AT the time of the celebration of the centennial of Pasteur's birth, in Strasbourgh, a congress of hygiene and bacteriology will be held for discussion of questions relating to disease. In order to show the sympathy of Great Britain with the projects of the French committee, a British committee composed of the following members has been formed: Sir Charles Sherrington, chairman, A. Chaston, H. E. Field, Professor Percy R. Frankland, Sir John M'Fadyean, Professor C. J. Martin, Sir W. J. Pope, Sir James Walker and Sir Almroth Wright.

UNIVERSITY AND EDUCATIONAL NOTES

BY the will of Frederic C. Penfield, who last served the United States in Austria as ambassador, $80,000 each is left to New York University, the University of Pennsylvania and the Catholic University, for Penfield scholarships in diplomacy and international affairs.

BY the will of Seymour Coman of Chicago, the University of Chicago is made trustee of his residuary estate, estimated to be approximately $145,000, the net income to be used for scientific research, with special reference to preventive medicine and the cause, prevention and cure of diseases. This bequest to be known as the Seymour Coman Research Fund.

STEVENS INSTITUTE OF TECHNOLOGY has secured from the United States government the two buildings erected by the Navy Department for the use of the steam engineering school conducted by the Navy at Stevens during the war. The smaller building has been remodeled to house the college library and the museum. One wing of the larger building has been adapted as a laboratory for the department of electrical engineering. The United States government has paid back to the trustees of the Stevens Institute of Technology a tax of $45,750 paid by the original trustees on the bequest providing for the foundation and endowment of the institute in 1870.

THE gift of £100,000 by an unnamed benefactor was announced by Lord Haldane on June 14 on the occasion of the laying of the foundation-stone of the new University College, Nottingham, which is to form the nucleus of the East Midlands University. The buildings will be situated in a large park lying between Nottingham and Beeston. This was given by Sir Jesse Boot, who had already made donations, amounting to £110,000.

FIVE additional professors for the medical department of the University of Georgia are announced as follows: Dr. Eliot R. Clark, from

the University of Missouri, professor of anatomy; Dr. Richard V. Lamar, professor of pathology; Dr. Virgil P. Sydenstricker, Augusta, professor of medicine; Dr. Ralph H. Chaney, Rochester, Minn., professor of surgery, and Dr. Harry B. Neagle, Adrian, Mich., professor of preventive medicine and hygiene.

DR. ARTHUR J. HILL, of the department of chemistry of Yale University, has been promoted to an associate professorship in organic chemistry, and Herbert W. Rinehart, Ph.D. (Yale, 1922) has been appointed an instructor.

DR. LLOYD L. SNAIL, of the University of Washington, has been promoted to an assistant professorship of mathematics.

DR. HARRY V. ATKINSON, of the University of Illinois Medical School, has been appointed associate professor of pharmacology in the department of medicine of the University of Texas.

DISCUSSION AND CORRESPONDENCE

BACTERIAL PLANT DISEASES IN THE PHILIPPINE ISLANDS

THAT fungus diseases of plants are numerous and destructive in the Philippine Islands is a well established fact. The extent of damage resulting from this class of organisms is great. Cane is reduced by Fiji disease up to 30 per cent.; the mung bean has suffered so severely that entire crops have been total losses, seedlings of tobacco, tomato and some other plants are severely handicapped by being parasitized by soil harbored fungi. Rusts take their toll yearly, not to mention the serious losses due to forest and timber destroying fungi.

On the other hand, bacterial diseases are scarce and especially so on hosts which have not been introduced from a temperate climate.

Tobacco and other solanaceous as well as some non-solanaceous plants are attacked by *Bacterium solanacearum* E. F. S., an organism which, without a doubt, has been introduced with certain host plants from temperate regions.

Citrus is attacked by the citrus canker organism, cabbage by *Pseudomonas campestris* (Pamm.) E. F. S., beans by *Pseudomonas phaseoli* E. F. S., cotton by *Ps. malvacearum* E. F. S., and parsley by an organism not previously described. So far as present information is concerned these bacterial diseases represent the entire number which are parasitic on economic hosts in central and southern Luzon. With the possible exception of citrus canker and the previously undescribed disease of parsley none of the diseases, or even more, none of the hosts are indigenous to the Philippines and there is no doubt that the diseases were imported for the most part with the hosts, from temperate regions.

The writer has been searching carefully for bacterial diseases and has made many isolations from numerous hosts in an effort to discover the cause of certain unreported maladies. In every case, with the exception of the parsley disease, no bacterial organism capable of initiating disease was found.

The scarceness of bacterial diseases is obvious and those which are commonly found, with the exception of citrus canker, have been brought, in all probability, with their respective hosts. This statement holds true for central and southern Luzon, only, for no work has been possible elsewhere.

COLIN G. WELLES

COLLEGE OF AGRICULTURE,
LOS BANOS, P. I.

SWORDFISH TAKEN ON TRAWL LINES

MR. HENRY D. WHITON, of New York, recently informed me of the capture of several swordfishes near New York late in December, on trawl lines set for tilefish, the information coming to him through Mr. Haroldson, the sailing master of his yacht. At my request Mr. Whiton asked the sailing master to look up details. He reported that four schooners took 13 swordfishes as follows: *William A. Morse* 2, *Columbia* 3, *Ruth M. Martin* 3, and *Benjamin W. Latham* 5. The swordfishes were all entangled in trawl lines set for tilefish at a point 110 miles southeast of Ambrose Channel lightship, the trawels being set at depths varying from 95 to 125 fathoms. All the swordfishes were taken during the period between Decem-

ber 20, 1921, and January 1, 1922. Their weight varied from 250 to 300 pounds.

With this information I called at the office of the Atlantic Coast Fisheries Company, owners, at Fulton Market, where Mr. J. M. Matthews, in charge of the office, after interviewing Captain Emil Rasmusen of the schooner *Ruth M. Martin,* made the following statement:

While fishing for tilefish 120 miles E. S. E. of Ambrose Channel lightship, a swordfish was found on the trawl line when hauled to the surface. The fish was entangled in the trawl apparently in an effort to obtain some of the tilefish that had been hooked. The tilefish near where the swordfish was entangled were cut and bruised, indicating that they had been attacked. There was no indication that the swordfish had been hooked or had taken any bait. The trawl line was looped around the sword close up to the head and wrapped around the body several times. On this trip three swordfish were taken on the trawls in the same manner. One weighed 265 pounds and had a sword about five feet in length. The other two weighed 254 and 185 pounds, respectively. The tilefish trawl had 320 hooks nine feet apart. The fishing ground is on the edge of the Gulf Stream.

I then interviewed Captain Jack Rasmusen of the schooner *Benjamin W. Latham.* He reported having taken five swordfish on tilefish trawls during the holidays, with a total weight of 990 pounds, the trawls being set at depths of 70 to 115 fathoms.

The masters of all four vessels stated that swordfish had never been caught in this manner before so far as they knew. There were no signs of swordfish at the surface when any of the trawl catches were made.

In going into the details of the matter, I was interested chiefly in ascertaining whether the swordfishes had actually gone to the bottom in search of food, but there does not seem to be any positive evidence on this point. The masters of the vessels thought that the unusual catches on the trawl lines were first felt at about 25 fathoms below the surface. All the swordfishes were much tangled up in the lines and most of them were dead when brought up. They probably attempted to raid the trawls while they were being lifted, and it is possible that some of them did so at depths considerably greater than that at which they were first noticed.

CHAS. HASKINS TOWNSEND
THE AQUARIUM,
NEW YORK,

MEXICAN ARCHEOLOGY

TO THE EDITOR OF SCIENCE: A somewhat inaccurate account of the communication on "Recent archeological discoveries in Mexico" that I made to the Royal Anthropological Society in London on November 22, 1921, having been reprinted in SCIENCE (April 7, 1922) from *Nature,* I would be obliged if you would permit me to refer those interested in the subject to the exact report of my text printed in *Man* (January, 1922), to rectify the following inaccuracies:

It was in 1909, not "in 1920" that specimens of the sub-gravel type were first brought to my notice. It was in the great pyramid of the Sun at Teotihuacan and not in the recently uncovered and reconstructed "small pyramid" that Señor Gamio pierced a tunnel. It was an age of two thousand years and not of "twenty thousand years" that the late distinguished volcanist, Dr. Temple Anderson, tentatively assigned to the lava bed at Coyoacan under which a second type of clay figurines was discovered. In his remarks Mr. T. A. Joyce referred to a figurine acquired by the British Museum "from Michoacan, Mexico," and not from "Ecuador."

ZELIA NUTTALL

QUOTATIONS

THE ISOTOPES OF TIN

THE insensitivity of the photographic plate in recording positive rays when compared with its sensitivity to light has long been observed, and has been accounted for by the fact that the action of positive rays is purely a surface effect. There has, therefore, always been the hope that considerable improvement could be made in this direction by increasing the concentration of the bromide particules on the surface of the gelatine. This hope has now been realized to some extent by the use of a method which, I understand, has been devised for the production of

Schumann plates. It consists essentially in dissolving off more or less of the gelatine by means of acid. I have not yet succeeded in obtaining certain or uniform effects, but in the most favorable cases the sensitivity of the "half tone" plates used in the mass-spectrograph has been increased ten to twenty times without seriously altering their other valuable properties.

The immediate result has been the definite proof of the complex nature of the element tin which had been previously suspected (*Phil. Mag.*, xlii, p, 141, July, 1921). Tin tetramethide was employed, and a group of eight lines corresponding approximately to atomic weights 116 (c), 117 (f), 118 (b), 119 (e), 120 (a), 121 (h), 122 (g), 124 (d) was definitely proved to be due to tin. This conclusion was satisfactorily confirmed by the presence of similar groups corresponding to $Sn(CH_3)$, $Sn(CH_3)_2$ and $Sn(CH_3)_3$. The intensities of the various components indicated by the letters in brackets agree quite well with the accepted chemical atomic weight 118.7, and incidentally preclude the possibility that any of the lines, with the possible exception of the extremely faint one at 121, are due to hydrides.

The spacing of these eight lines, which are only just resolved, show that their differences are integral to the highest accuracy, but the lines themselves compared with known lines on the plate give atomic weights always tending to be 2 or 3 parts in 1,000 too light for the above whole numbers. That this remarkable divergence can not be explained as experimental error is very strongly indicated by the following consideration. The discharge tube had been used previously to investigate some very pure xenon. The line due to $Sn^{120}(CH_3)$ should therefore have appeared exactly halfway between the two strong xenon lines 134, 136. It was actually quite unmistakably nearer the former, so much so that the two were only partially resolved. The same irregular grouping repeated itself in another portion of the field in the following spectrum. It seems, therefore, difficult to resist the conclusion that the isotopes of tin have atomic weights which are less than whole numbers by one fifth to one third of a unit of atomic weight, but satisfactory settlement of this important point will probably have to be deferred till a more accurate mass-spectrograph has been made.

Incidentally I may add that the presence of the two faint components of xenon 128 and 130 previously suspected has now been satisfactorily confirmed.—F. W. Aston in *Nature*.

SPECIAL ARTICLES

CRATERLETS IN EAST-CENTRAL ARKANSAS PROBABLY DUE TO THE NEW MADRID EARTHQUAKE

THE following brief description of six craterlets occurring on and about the border between the southeast quarter of Sec. 31 and the northeast quarter of Sec. 32, T. 8 N., R. 7 E., is of interest because it apparently extends the sphere of destructive violence of the New Madrid earthquake from that illustrated in Bulletin 494, United States Geological Survey, to within about 20 miles northwest of Memphis. These are also of interest because few, if any, larger than these have been described.

Occurrence: Five of the craterlets occur on the upper surface of one of the low ridges of the Mississippi flood plain. The sixth is a double craterlet, occurring on the slope of the ridge. They apparently bear no relationship to each other except as regards origin and age. With the exception of the double craterlet, they are saucer-shaped, with diameters ranging from 10 to 40 feet, and depths ranging from 2 to 6 feet. One part of the double craterlet is about 15 feet by 10 feet along the diameters of its elliptical outline. The smaller craterlet is about 10 by 8 feet along similar directions. They are separated by a ridge about three feet high. The bottoms of both craterlets lie about 4 to 5 feet below the surrounding surface. These craterlets are all located within a radius of 800 feet.

Origin: The ridge on which these craterlets occur has long been cultivated, and between cultivation and sporadic attempts to fill them up, any evidences of rims that may have surrounded the craters have disappeared. However, the material about the craterlets is made up of the characteristic fine sand and clay that appears in all the dredgings in this vicinity, together with rocks that range in size from 1 inch through to 11x4x5 inches. These rocks

very clearly are not indigenous to the flood plain materials that form the ridge. The supposition is that they were forced up from below by gaseous and water pressure that gave rise to the craterlets.

Age: No evidences as to age was obtained by the writer. However, as similar craters are found farther to the north and are there shown to have been formed at the time of the New Madrid earthquake, it is logical to assume that these were formed during the same disturbances.

E. T. THOMAS

UNIVERSITY OF ARKANSAS

AZOTOBACTER IN SOILS[1]

SOME time ago the writer[2] called attention to the apparent relation existing between the presence of Azotobacter in soils and the absolute reaction of the soil. At that time less than one hundred soils, all local, had been examined and the reaction was determined colorimetrically upon an extract of the soil. Since then 418 samples of soil collected from 39 counties in Kansas and 25 states other than Kansas have been cultured for Azotobacter and their presence or absence in such cultures compared with the absolute reaction of the soil determined colorimetrically upon an extract of the soil, and also with the reaction of the soil determined electrometrically upon a suspension of the soil.

These soils have been arbitrarily divided into two groups: those, the hydrogen-ion concentration of which was found to be greater than 1×10^{-6}; and those with a lower hydrogen-ion concentration. This particular division point has been chosen because the large amount of data that have been accumulated indicate that the maximum hydrogen-ion concentration tolerated by Azotobacter is very near this point. Comparing the presence and absence of Azotobacter in these two soil groups with the reaction we can, by making use of Yule's[3] association correlation formula, obtain a mathematical expression for the association or correlation existing between the reaction and the presence or absence of Azotobacter.

An application of this formula to our data gives, when the reaction of the soil was determined colorimetrically, a coefficient of 0.956. When the reaction was determined electrometrically the coefficient was found to be 0.942.

It has been demonstrated in this laboratory that when Azotobacter are introduced into a soil with a hydrogen-ion concentration greater than 1×10^{-6}, and not containing Azotobacter, they can exist therein for an appreciable length of time. Considering the relative ease with which soils may become inoculated under natural conditions, and also the probability that other conditions may inhibit the growth of Azotobacter in soils the reaction of which is favorable, it is believed that an association, or correlation coefficient as high as that indicated above is significant in indicating the influence of the hydrogen-ion concentration of a soil upon the ability of that soil to support Azotobacter.

P. L. GAINEY

KANSAS AGRICULTURAL EXPERIMENT STATION

[1] Contribution No. 47, Department of Bacteriology, Kansas Agricultural Experiment Station.

[2] P. L. Gainey: SCIENCE, N. S., 48, pp. 139-140; *Jour. Ag. Res.*, 14, pp. 265-271.

[3] G. Udny Yule, *Phil. Trans. Roy. Soc.*, Ser. A, Vol. 194, pp. 257-319.

GENERAL MEETING OF THE AMERICAN CHEMICAL SOCIETY

THE sixty-third general meeting of the American Chemical Society was held at Birmingham, Alabama, Monday, April 3, to Friday, April 7, 1922, inclusive. The council meeting was held on the third, the general meeting on the morning and afternoon of the fourth and divisional meetings all day Wednesday and Thursday. Excursions were enjoyed in Birmingham on Friday, and some fifty of the members took a special excursion to Muscle Shoals on Saturday. Full details of the meeting and program will be found in the May, 1922, issue of the *Journal of Industrial and Engineering Chemistry*. The registration was 381, coming from 36 states and one from the island of Mauritius. Twenty-eight ladies attended the meeting.

General public addresses were given by Carlile P. Winslow, director, U. S. Forest Products Laboratory, on "The development of

the forest products industry in the south," and by William H. Stone, associate editor of the *Manufacturers' Record,* on "The remarkable development of the south and its relations to the American chemical industry," and a public address to the people of Birmingham by Professor Marston Taylor Bogert on the evening of April 5 under the title, "The flower fields and the organic chemist. Perfumes—natural and synthetic."

At the general business meeting held on Tuesday morning, April 4, resolutions and tributes were presented to the general society on our late honorary member, Giacomo Ciamician, and a long time councilor and active member, the late Dr. Charles Baskerville, the society remaining standing for a few moments as a tribute to the memory of each.

Following these tributes to members of the society, Dr. W. A. Noyes referred to the work of Adolph von Baeyer and Emil Fischer.

At the general meeting on Tuesday afternoon the following general papers were presented:

The manufacture of phosphoric acid in the electric furnace by the condensation and electrical precipitation method: THEODORE SWANN.

The pioneer's field in petroleum research: VAN H. MANNING.

Information needs in science and technology: CHARLES L. REESE.

Recent developments of the chemistry of rubber: W. C. GEER.

Some research problems in the canning industry: W. D. BIGELOW.

Chemistry in the old south and the new: FRANCIS P. VENABLE.

The following divisions and sections met: Divisions of Agricultural and Food Chemistry, Biological Chemistry, Dye Chemistry, Industrial and Engineering Chemistry, Organic Chemistry, Physical and Inorganic Chemistry, Rubber Chemistry, Sugar Chemistry, and Water, Sewage and Sanitation Chemistry; sections of Cellulose Chemistry, Chemical Education, History of Chemistry, and Petroleum Chemistry. Full details of their meetings will be found in the May issue of the *Journal of Industrial and Engineering Chemistry.*

On Tuesday evening a very enjoyable smoker was tendered by the Alabama Technical Association to the society at the Southern Club. The Country Club, the Roebuck Country Club and the Southern Club were open to the members throughout the meeting. On Friday excursions were made to the industrial plants around Birmingham and a barbecue was given at noon, which was a unique experience to many of the members and was enjoyed by all. The scientific program was extensive, 237 papers being presented.

DIVISION OF AGRICULTURAL AND FOOD CHEMISTRY

T. J. Bryan, *chairman*

C. S. Brinton, *secretary*

Composition, grade and baking qualities of self-rising flour: BENJAMIN R. JACOBS. The author discusses briefly grades of wheat and flour, and the process of milling ordinary flour. Examination of forty-seven samples of commercial self-rising flour and a few samples of this product made in the laboratory was made. The data give determinations of moisture, protein, total ash, added salt, P_2O_5, SO_3, CO_2 available and residual, microscopic count of bran and hair particles and baking tests. From these data the author shows that approximately 25 per cent. of the commercial product is of a grade inferior to what is commonly known as "straight" grade of flour. He also shows that a large number of samples contain excessive amounts of acid-calcium-phosphate and are deficient in CO_2. The baking experiments which are accompanied by photographs show that many of these self-rising flours make biscuits of inferior quality, this inferiority being due to the grade of flour used as well as to deficiencies in CO_2.

Bleached and self-rising flours: JUANITA E. DARRAH. This paper discusses the nutritive values of bleached and self-rising flours and gives the results of a series of experiments in feeding rats. The author's conclusions are that bleached flour is inferior. Self-rising flour is not necessarily inferior, if not bleached and if milled and compounded correctly and marketed in original packages. She recommends that stringent measures should be adopted to standardize such flours, and for protection of the honest miller there should be required a statement of the proportion of all ingredients on the label. It is concluded that the better growth of rats fed on products made from self-rising flour over those fed on bleached flour diet must be due to the presence of the phosphates in the leavening agents added in the manufacture of self-rising flour. This has

led to a comparison of the phosphate and tartarate baking powders in addition to the flour problem. This work is still under way.

Composition and nutritive value of yeast grown in vitamine-free media: JUANITA E. DARRAH. The problem here was to determine the nutritive value of yeast grown from such substances as extracts of wheat and alfalfa, after a series of treatments to destroy the vitamine content. The media of B. MacDonald and McCollum was adopted for the experiments, but with a higher concentration of sugar. In addition, oats with vitamine destroyed were added. Rats and guinea pigs were given various diets, and the results were recorded. The author's conclusions are: 1. Yeast may be readily grown in vitamine-free media through an exceedingly large number of transfers. 2. Yeast grown in this way contains protein and nitrogenous bases of undoubted nutritive value. 3. Evidence of dietetic value of yeast grown in such media is not substantiated. There was only very slight indication of presence of water-soluble B, and none of fat-soluble A or water-soluble C.

New sources of water-soluble C and fat-soluble A in the southeast: JUANITA E. DARRAH. New sources of these vitamines have been found; water-soluble B and C are abundant in Jerusalem artichokes, and fat soluble A is fairly abundant in Avocado pears. Five guinea pigs were fed scurvy diet and succumbed in three weeks in so far as to show unmistakable symptoms of scurvy. Two of these died. One had just been through a previous attack of scurvy and had recovered. Another died, due to chilling on a cold day, when there was a delay in securing the artichokes. The other three recovered entirely on addition of the Jerusalem artichokes in five gram quantities per diem, added to the usual scurvy ration. When protein and mineral salts are supplied in suitable amounts, there is sufficient water-soluble B in Jerusalem artichokes to promote normal growth in white rats, when fed as the sole source of this vitamine in quantities of three grams dried artichoke to ten of the dry water-soluble B free mixed diet. There is sufficient fat-soluble A in Avocadoes to promote considerable growth in white rats; and to prevent sore eyes for a very long period, no xerophthalmia was induced. This is true of a diet adequate in other respects in protein, vitamine content and energy value. No reproduction tests have been secured.

Foods, facts, fancies and follies: EDWARD GUDEMAN. This paper discusses the subject of foods from the viewpoint of, firstly, their production, distribution, inclusive of adulteration and substitution, and secondly, from the viewpoint of national habits and follies as to consumption and conservation. It calls attention to the exhausting and wastage of good agricultural lands, the same as with other natural resources, and recommends the reclamation and occupation of the 2,225,000,000 acres of tillable land now lying barren, by employment of the unemployed, the same suggestion as made by President Roosevelt and Secretary Lane for returned soldiers in 1919, such work to be under direct control and supervision of the federal government. Such action would provide labor for thousands of men, would greatly increase the resources of the nation and would create a demand for the products of the government's nitrogen fixation plants, without coming into competition with existing fertilizer manufacturers. It is a paper for the layman without the use of scientific or technical terms.

The determination of hydrogen sulfide by foods when cooked at various temperatures: EDWARD F. KOHMAN. A method has been developed in which the food is heated in a flask in an autoclave. The flask is fitted with a stopper carrying two glass tubes. The inlet tube passes to the bottom of the flask and opens in the autoclave. The outlet tube passes through the pine wood stopper of the flask and up through the top of the autoclave and carries a glass stopcock. The autoclave is supplied with steam from a boiler. By this device food may be heated at any temperature for any length of time, while the water content remains constant. At the same time the hydrogen sulfide formed can be collected and determined as barium sulfate. The method is a quantitatively accurate one. Its application to other steam distillations under pressure is considered. It should have wide application in many organic preparations.

Studies of the availability of organic nitrogenous compounds. II (by title): C. S. ROBINSON.

The interpretation of mechanical analysis of soils as affected by soil colloids: R. O. E. DAVIS. So-called mechanical analysis of soils is one in which the soil is divided into its mineral constituents according to the grain sizes of the material. This mechanical analysis has an important bearing on indicating the character of the soil and its physical properties. From the results of such an analysis may be judged the water-holding capacity of soils and their relations to tillage operations, and, more important, their probable productivity. In carrying out such an analysis it becomes absolutely necessary, first, to break up all

aggregates of soil material and then to go through the operations by which the different sizes are separated. The various methods employed have used various means for deflocculation of the soil material, but the method adopted as most satisfactory by the Bureau of Soils has been that of shaking the sample of soil with water for a period of about seven hours. Experiments recently carried on have demonstrated that the colloid content of soils is considerably greater than has been generally believed. These experiments have shown that the so-called clay separate obtained in the mechanical analysis, consisting of material grains smaller than .005 of a millimeter in diameter, is made up partly of aggregates of colloidal material. These aggregates have withstood the shaking operations without breaking down, but it has been demonstrated that they can be broken down and obtained in a dispersed state by rubbing lightly with the finger or rubber pestle. These results indicate the insufficiency of our present methods of mechanical analysis and show that in addition to the separations as obtained at present this method may have to be supplemented by a determination of the amount of colloid contained in the soil and the main separate groups, such as the clay and silt.

Studies on flavors, beverages and related products. 1. The determination of methyl anthranilate:[1] J. W. SALE and JOHN B. WILSON. A colorimetric method for the determination of methyl anthranilate in genuine and imitation grape products which depends upon the formation of a red azo dye, is described. The reagent used is sodium-1-naphthol-2-sulphonate. Experimental data are given which show that the method is quantitative. Advantages of the method described over others in current use are: first, the method is quantitative; second, the test is applied directly to distillate, thus avoiding possible loss of ester through extraction and subsequent evaporation of solvent; third, use of hydrazine sulphate in place of urea for destroying excess of nitrous acid. The method is recommended in the examination of products which are believed to be sophisticated.

Studies on flavors, beverages and related products. 2. Determination of methyl alcohol in extracts:[2] JOHN B. WILSON and J. W. SALE. The merits of a number of well-known tests for methyl alcohol are discussed and data are given which show their relative value and delicacy. The Denigée and Lyons' tests are found to be the most satisfactory for examination of flavoring extracts suspected of containing methyl alcohol. Flavoring extracts contain a variety of esters and essential oils which interfere unless the analysis is conducted properly. The sample to be analyzed should be adjusted so that it will have a volume of 100 cc and contain not more than ten per cent. of ethyl alcohol. Interfering substances are eliminated by salting the sample, extracting it with petroleum ether previous to distillation, and distilling, using a fractionating column. Thirty cc of distillate are collected in which will be found practically all the ethyl and methyl alcohols. The colorimetric tests to be applied are described in detail.

Relations between the active acidity and the lime-requirement of soils: EDGAR T. WHERRY. Lime requirement is stated in parts per thousand of CaO, and, because of the ease with which relative values can be appreciated, active soil acidity is stated in the form of specific acidity. The ratio between these in a given soil may be expressed by a correlation coefficient C, obtained by the equation: $L.R. = C \times (S.A. - 1)$. The value of C is believed to be a measure of the adsorptive power of the soil colloids for hydrogen-ion. The coefficient C has been found to vary so widely from one soil to another, from an untreated to a limed soil, and even from one depth to another in the same soil, that it is impracticable to calculate lime-requirement from acidity determinations in general, as has been proposed. Soils may be roughly classified on the basis of the value of C, a convenient ratio between classes being 3/10; but only if some simple procedure is first devised for classifying a given soil can there be obtained from its specific acidity a value for its lime-requirement.

Characteristic proteins in high and low protein corn: M. F. SHOWALTER and R. H. CARR. The protein content of corn is subject to wide variations by breeding and selection. The highest protein ear the writers have been able to produce contained 18.43 and the lowest 7.62 per cent. protein. A study has been made of the relative abundance of the different proteins in corn, and it was found that zein was the important protein which varied most, averaging 50.28 per cent. in high protein and only 31.85 per cent. in low protein corn. The averages for the other proteins are: glutelin 38.11, glolulin 3.70, albumen 3.92,

[1] Contribution from Water and Beverage Laboratory, Bureau of Chemistry.

[2] Contribution from Water and Beverage Laboratory, Bureau of Chemistry.

and amide 2.81 per cent. in the high protein and 52.15, 1.53, 8.21 and 6.25 respectively in the low protein corn. The zein is higher yet in high protein popcorn, averaging 57.24 per cent.

Errors in the determination of fat in cream: E. G. MAHIN and R. H. CARR. The use of hydrocarbon oils, non-miscible with butter fat, for eliminating the upper meniscus in the necks of Babcock bottles has become quite natural. More recent experimental results in the Purdue laboratory have shown that in the hands of the ordinary dairy tester this results in readings averaging about 0.5 per cent. lower than when the bottom of the meniscus, obtained without added oil, is used. As the latter has formerly been shown to be about 0.5 per cent. lower than is given by the gravimetric method, the use of such oils (such as "glymol") ordinarily results in a loss of about 1.0 per cent. of fat for each test. Ten large creameries in Indiana averaged 100,000 cream tests in 1917. Upon the assumption that each test represented a five-gallon lot, this represented approximately 500,000 gallons of cream. An experimental error of 1.0 per cent. in the fat determination therefore meant a loss to the producer of more than 40,000 pounds of butter fat, if the "glymol" method was used in all cases. The value of this fat was approximately $20,000. The reading error has been found to vary according to the method of adding the oil. If the latter is added slowly and carefully, little or no error occurs. If the oil is run in rapidly, as is ordinarily the case, it momentarily sinks into the liquid butter fat, and as it rises it carries some of the latter upon its surface, thus decreasing the length of the residual fat column. It is conclusively shown that the method is not safe in the hands of the average dairy tester, but the use of amyl alcohol for this purpose, substituted for hydrocarbon oils, gives reliable results in all cases.

The commercial purification of phosphoric acid by crystallization: WILLIAM H. ROSS, C. B. DURGIN and R. M. JONES. Commercial phosphoric acid contains among other constituents such poisonous impurities as lead, arsenic and fluorine. Acid intended for use in the manufacture of foodstuffs must therefore be treated for the elimination of these materials. This is done, at present, by precipitation with the aid of suitable reagents. The effectiveness of this method is limited by the solubility of the precipitate in the acid. It has been found that by concentrating phosphoric acid, at a temperature below 105°, to a specific gravity of 1.85 at 20° and inoculating with a crystal of phosphoric acid, the greater part of the acid will crystallize, leaving the impurities in the mother liquor. The crystallization may be repeated by centrifuging, melting the crystals at a temperature above 40° C., cooling to ordinary temperature, adding water to bring to a specific gravity of 1.85 and again inoculating. Two or even one crystallization will usually be sufficient for acid of commercial quality, but by repeated crystallizations acid of any desired degree of purity may be obtained. When phosphoric acid is prepared by the volatilization process and collected in a Cottrell precipitator, it is usually of such a concentration that it may be crystallized with little or no initial concentration. The crystallization method is therefore especially adapted to the purification of volatilized phosphoric acid and experiments on the commercial development of the method are now in progress.

Do velvet beans contain vitamin B? E. R. MILLER. Fourteen pigeons were fed on an exclusive diet of polished rice until pronounced symptoms of polyneuritis appeared. Seven of these were restored by feeding each five grains of corn. The other seven were fed five velvet beans each with the result that all were improved temporarily, but all died within two to six days. Of another group of six which were fed polished rice, two died, apparently from starvation. Of the four brought down with polyneuritis, three were completely restored by administering to each 0.5 grams of an alcoholic extract of velvet beans and one was partially restored. This amount of extract represented three beans of average size. The more favorable results obtained with the second group is probably due to the greater availability of the vitamin and is believed to show that the velvet beans contained a fair amount of vitamin B.

The occurrence and composition of some Alabama phosphates: B. B. ROSS.

The mineral requirements for the nutrition of wheat during the seedling phase: H. H. KING and M. C. SEWELL. Wheat was grown in sand cultures, the nutrient solution consisting of KH_2PO_4, $Ca(NO_3)_2$ and $MGSO_4$ and the concentration of the salts in each pot having a calculated osmotic value of 1.00 atmosphere but differing by increments of ⅛ in salt proportions. The pots were arranged in duplicate triangles of twenty-one pots each. The experiment was carried through the seedling phase of five weeks' length. Solution R_4S_2 which was chosen as best consisted of KH_2PO_4, $Ca(NO_3)_2$ and $MgSO_4$ in the following proportions, 3:2:3, and the respective partial vol-

umes molecular concentrations being 0.0072, 0.0048, 0.0072. The basis for the determination of the best solution was the dry weight of tops. To five pots vitamines extracted from yeast was added. This increased the growth of the plants quite noticeably.

A dietary study of some state institutions: E. H. S. BAILEY. This is a study of the dietary of each of the groups at the different institutions under the care of the Kansas State Board of Administration, where shelter, food and clothing are provided. The calculations are made from a complete report of all the food used for a series of months, sometimes during the entire year. The proteins, fats and carbohydrates and the calories per day per capita are worked out for each institution according to a commonly accepted method. The number of inmates at these institutions being large, and the conditions varied, an excellent opportunity is afforded for a comparison and for constructive criticism on the quantity, variety and cost of the food furnished.

Studies on the electropure process of treating milk: FLOYD W. ROBISON. This paper gives a résumé of previous work on the treatment of milk by electricity and gives in detail the results of the author's studies on the improved apparatus. The apparatus is described in detail and its essential characteristics emphasized. Results of studies on bacterial reduction; keeping qualities of the treated milk; effect on cream line, etc., are given and include a very thoroughly conducted experiment on the effect of the process on bacteria of tuberculosis in milk. The great value of the process is pointed out and certain automatic control features dwelt upon. The application of the electric current and the method of preventing the electrodes from becoming hot, thus eliminating any heated taste, are important features in the light of their effect on the treated milk. The process produces a milk free from pathogenic organisms and with a phenomenal bacterial reduction. The keeping quality of the treated milk is excellent and its commercial values otherwise greatly enhanced. The apparatus is illustrated.

The rôle of manganese in plants: J. S. MCHARGUE. The purpose of this investigation was to determine if manganese has any definite function to perform in plant economy. The method of attack has been the preparation of plant nutrient compounds and quartz sand, free from manganese, and the growing of plants in different portions of nutrient solutions or sand cultures from which manganese was withheld and in another equal number of portions of these media to which manganese was added. All the plants were grown until those that received manganese showed signs of fructification and a few to maturity. The plants from which manganese was withheld made a normal growth for about six weeks only. Thereafter they became chlorotic and the young leaves and buds died back and the plants made no further growth of any consequence, whereas the plants to which manganese was available grew in a normal way and fructified where the plants were grown to that state of maturity. The author concludes that manganese is necessary in the plant economy and that, therefore, eleven elements are necessary for the normal growth of autotrophic plants, whereas it has been taught previously that only ten are necessary.

The absorption of water by soil colloids: W. O. ROBINSON. A method is given for determining the amount of water absorbed by the air-dried colloid under specified conditions. It was found that the water absorbed by purified colloids from thirty-five different soils was nearly a constant, the average being .298 grams of water absorbed per gram of colloid. A tentative method is proposed for determining the amount of colloid in a soil by finding the amount of water absorbed and dividing this figure by .298. The assumptions involved are discussed.

DIVISION OF PHYSICAL AND INORGANIC CHEMISTRY

S. E. Sheppard, *chairman*

R. E. Wilson, *secretary*

Theory of the structure and polymorphism of silica: ROBERT B. SOSMAN. There exists a wide variety of experimental data on the forms of silica, and particularly on quartz, which have never been assembled and explained on the basis of a single consistent set of hypotheses as to the ultimate structure of this substance. This paper attempts to provide such a set of hypotheses, based upon the general knowledge already gained concerning the structure of matter in general and silica in particular. It is believed that the silica atom-triplet maintains a certain degree of individuality in its amorphous and crystalline states as well as in its compounds, and the freedom of its oxygen atoms to change their positions with respect to the silicons is restricted. The triplets are assumed to assemble into chains or threads in the liquid and glassy states, and a thread structure persists in the crystalline states (cristobalite, tridymite, chalcedony, quartz). The high-low or alpha-beta inversions in all the forms are thought to be due to the same underlying change, namely,

a change in the shape of the silicon atom and in the relative positions of the two oxygen atoms attached to it.

A general conception of acids, bases and salts: HAMILTON P. CADY and HOWARD M. ELSEY. General definitions are suggested for acids, bases and salts which it is believed will include all systems whether containing hydrogen as one of the constituents of the solvent or not. According to this view, an acid is defined as a substance which ionizes to yield the same cation as is given by the direct ionization of the solvent. A base is a substance which, by its direct ionization, yields the same anion as the solvent. General definitions may be easily derived for salts, neutralization, hydrolysis and other terms. These definitions are applied to solutions in sulfur dioxide.

Crystallography and atomic structure: EDGAR T. WHERRY. Instead of treating crystal structure from the viewpoint of point-systems, it is desirable for some purposes to consider the atomic domains, or spaces, with which each atom acts. The most important domains which are geometrically possible are figured, and summaries given of the elements known to possess each. It is held that in any atom in the crystalline state the electron arrangement possesses the same symmetry as the domain within which that atom lies. The structures on the basis of Langmuir's synthesis of earlier theories and of Bury's modification of it are compared with the simplest possible structures reconcilable with the geometrical requirements. It is thought that in some atoms the two electrons of the helium nucleus are not stationary, but revolve so as to produce a spherical external field of force. From lithium up to calcium the arrangements are simply related to those accepted by both Langmuir and Bury, but in the elements of higher number the arrangements suggested by Langmuir are not capable of passing into those fulfilling the geometrical requirements as readily as are those of Bury. The conclusions as to the simplest structures reconcilable with the domain symmetry in the cases of most of the elements of which the domains are known are shown in a final tabulation.

Equilibrium in the reduction of iron oxides and in the oxidation of iron by steam: A. S. RICHARDSON, F. C. VIBRANS and W. P. BELL. Equilibrium in the systems H_2-H_2O-Fe-FeO, H_2-H_2O-FeO-Fe_3O_4, CO-CO_2-Fe-FeO, and CO-CO_2-FeO-Fe_3O_4, have been commonly supposed to apply to the reducing and steaming phases of the steam-iron process of hydrogen manufacture. The literature on these equilibria is itself conflicting, but in still worse agreement with the authors' observations on the first stages of both reducing and steaming the iron contact mass used in hydrogen manufacture. Higher conversion of steam to hydrogen and higher conversion of reducing gases to oxidized gases have been obtained than the equilibrium data indicate to be possible.

Solubility measurements on sulfur dioxide: STEWART J. LLOYD. The solubility of sulfur dioxide was determined in naphthalene, acetone, ether, ethylene bromide, butyric acid, ethyl acetate, trichloracetic acid, carbon tetrachloride and chloroform. Distinct irregularities were observed with trichloracetic acid, chloroform and carbon tetrachloride, and a further study of them is under way.

Esterification equilibria in the gaseous phase: GRAHAM EDGAR and WM. H. SCHUYLER. The equilibrium in the gaseous phase between acetic acid, alcohol, ethyl acetate and water has been measured by distilling a small amount of vapor from the liquid equilibrium mixture, chilling and analyzing. The composition of the distillate differs widely from that of the liquid. Calculations of the equilibrium constant in the gaseous phase are complicated by the partial association of the acetic acid, but indicate a much more complete esterification than in the liquid phase. The results are in accord with qualitative results of Berthelot and Pean de Saint Gilles, and have an important bearing upon the high yields of ester obtained by Reid when passing alcohol and acetic vapor over silica gel.

Partition ratios and solubility numbers: N. E. GORDON and E. EMMET REID. Formic acid has been partitioned between water and a number of organic solvents in which the solubility of formic acid has been determined. From the partition ratios and the solubilities an attempt has been made to estimate the tendency of formic acid to dissolve in water.

The amphoteric ionization of hypochlorous acid: WILLIAM A. NOYES and THOMAS A. WILSON. The ionization constant of hypochlorous acid as an acid was determined by measuring its conductivity in 0.001 normal solution and also the conductivity of solutions 0.001 normal for sodium hypochlorite and for calcium hypochlorite, prepared by mixing a solution of pure hypochlorous acid with solutions of the respective bases. The solution of hypochlorous acid was prepared by distilling, under diminished pressure, chlorine water in contact with yellow mercuric oxide. The ionization constant found was between 6.60 and 6.79×10^{-10}, a value somewhat smaller than that

of Sands calculated from entirely different data. No measurable difference could be found between the conductivities of 0.001 and 0.0001 normal nitric acid and the conductivities of solutions which were 0.001 or 0.0001 normal for both nitric and hypochlorous acids. In other words, the ionization of hypochlorous acid as a base, to positive chlorine and hydroxyl ions, can not be shown by this method. It was shown by determining the composition of the vapors carried away from solutions of pure hypochlorous acid by a current of air that these contain chlorine monoxide, Cl_2O, and not hypochlorous acid, HClO. The chlorine monoxide is evidently formed by the union of positive chlorine ions with hypochlorite ions, showing very clearly the amphoteric ionization of the acid. Jakowkin has shown by the freezing point lowering that solutions of hypochlorous acid contain chiefly the unionized acid.

The ionization of butyl mercuric hydroxide: W. V. EVANS and LOUISE OTIS. It is generally stated in the literature that substances of the type RHgOH are strong bases, but no experimental data exist. Preliminary conductivity measurements show that butyl mercuric hydroxide is a weak base. Because of its hygroscopic nature weighing out samples is unsatisfactory. Ordinary titration of the base offered difficulties which were overcome by adding sodium chloride, thus precipitating out butyl mercuric chloride and leaving NaOH to be titrated. Molecular weight determinations by the freezing point method showed ionization varying from about 10 per cent. in .1N solution to about 40 per cent. in .02N. This preliminary study has shown several interesting properties of the base. A trace of the base in water changes the surface tension of the water in such a way that the solution does not wet glass. A solution of butyl bicarbonate on boiling loses all of its carbon dioxide, leaving a solution of the pure base.

Ammono nitric acid: EDWARD C. FRANKLIN. Assuming a structure represented by the formula H-N-N-N hydrazoic acid may be looked upon as a nitric acid of the ammonia system. In agreement with this view it has been found first, that a mixture of hydrazoic acid and hydrochloric acid dissolves the noble metals; second, that sodium oxide (sodium ammono nitrate) nitridizes sodium cyanide (sodium ammono carbonite) to sodium cyanamide (sodium ammono carbonate); third, that potassium nitrate (potassium aquo nitrate) may be ammonolyzed to potassium oxide (potassium ammono nitrate); and fourth, that nitrous oxide (a mixed acid anhydride acid anammonide) reacts with potassium hydroxide to form potassium nitrate.

The drainage error in viscosity measurements of viscous materials by the capillary tube method: EUGENE C. BINGHAM and H. L. YOUNG. Tests with bulbs of 8 to 24 ml capacity show that the amounts of liquid left on the wall of the bulb for a given time of efflux are nearly independent of the size of the bulb, but they are directly in proportion to the viscosity of the liquid. The authors have constructed a tube which shows the drainage correction for any particular viscosity at the different rates of efflux.

Hydrogen ion concentration and the properties of the emulsoid colloids: ROBERT H. BOGUE. It is shown that the various physical properties of the emulsoid colloids, as viscosity, jelly strength, melting point and joining strength (of glues) are at a minimum at a hydrogen ion concentration corresponding to the isoelectric condition. As the acidity or the alkalinity of the solution is increased from this point, these properties rise in value to certain maxima. It is shown that salt precipitations for gelatin content should be made at the isoelectric condition if maximum precipitation is desired. The necessity for a careful control of hydrogen ion concentration in investigational work on the emulsoid colloids is emphasized, and the desirability of a similar control in the plant during manufacture is pointed out. The limitation of benefit from such control makes questionable, however, the practicability of such methods for the purpose of the improvement of grade. The estimation of hydrogen ion concentration as one of the tests in evaluation is urged, but it is not recommended that all tests for viscosity, jelly strength, etc., be made at a specified p_H value.

The elasticity of ash-free gelatin jellies: S. E. SHEPPARD and S. S. SWEET. In an earlier paper on "The elastic properties of gelatin jellies" the authors gave results on the measurement of the modulus of rigidity of gelatin jellies from commercial gelatins, at various concentrations and p_H values. Certain anomalous results were obtained on variation of p_H. It was suspected later that these anomalies might depend upon the (inorganic) ash constituents, and elastic measurements have been repeated on carefully de-ashed gelatin at various concentrations and p_H values. The new results show that for this purified gelatin a maximum of rigidity (jelly-strength) is obtained at

about $p_H = 8$, at all concentrations; the curves show a "shoulder" near the isoelectric point ($p_H = 4.8$) but no definite maximum or minimum. On adding aluminum salts, to give as low as .01 per cent. Al_2O_3 on dry gelatin, the course of the curve was greatly altered, a secondary maximum being produced at $p_H = 5$, and the maximum on the alkaline side displaced.

The formation of inorganic jellies: general theory: HARRY B. WEISER. Factors that influence the formation of jellies in general are: A jelly may be expected to form if a suitable amount of a highly hydrous substance is gotten into colloidal solution and allowed to precipitate at a suitable rate without stirring. If the concentration of the hydrous substance is too low, no jelly or only a very soft jelly can result. If the precipitation from colloidal solution is too rapid, contraction is likely to occur with the formation of a gelatinous precipitate instead of a jelly; if too slow, the particles are likely to grow and settle out in a granular or sandy mass. The effect of the presence of salts on jelly formation is determined by the agglomerating and stabilizing action of ions, in so far as these affect the rate of precipitation.

The adsorption and orientation of molecules of dibasic organic acids and their ethereal salts in liquid-vapor interfaces: H. H. KING and R. W. WAMPLER. Adsorption values are given for oxalic, malonic, succinic, fumaric, maleic and d tartaric acids and the di-ethyl esters of all the above acids with the exception of oxalic and maleic. The values were calculated using Gibbs' equation. Hydroxyl groups and double bonded carbons increase the surface tension, as is shown by the fact that d tartaric acid has the highest surface tension, and in order maleic malic to succinic, which has the lowest. The higher surface tension of the acids as compared with the esters is due to their polarity. The influence of the polar groups in the esters is similar. The esters are adsorbed more than the acids due to the replacement of the polar groups with the insoluble ethyl group. The molecules are orientated so that the polar groups are in the liquid leaving the carbon chains in the surface. Tartaric acid is negatively adsorbed, the surface tension of an 8 M solution being 74.125 and a .125 M solution being practically that of water.

The atomic weight of lanthanum: B. S. HOPKINS and F. H. DRIGGS. The lanthanum from 182 kg. of cerium group double sulphates was purified by fractional crystallization of the double magnesium nitrates until free from neodymium followed by fractional crystallization of the double ammonium nitrates. The arc and absorption spectra of the insoluble end of this series showed it to be free from all other rare earths. The material was further purified by eight alternate precipitations with ammonia and oxalic acid. The pure oxide was converted to the chloride in a quartz flask with pure dry HCl and weighed. A nearly equivalent amount of pure silver was weighed out, dissolved in HNO_3 and added to the solution of $LaCl_3$. The deficiency of silver or chloride was added from a standard solution of $AgNO_3$ and NaCl. Equivalence was tested for with the nephalometer. From the ration, $LaCl_3 : 3Ag$, the atomic weight of La was calculated. The average of five determinations was 138.91.

Thermo-regulator: E. B. STARKEY and NEIL E. GORDON. A thermo-regulator, designed to meet the needs of the individual student in physical chemistry. It has an accuracy to .05° C., and does not require a relay or battery. Furthermore, the point of contact is enveloped in an atmosphere of inert gas, and hence there is no oxidation at the point of contact.

The concentrations of alkali halide solutions of the order of 0.0001 N most favorable to adsorption by barium sulphate: JACK P. MONTGOMERY. Each halide was used in concentrations progressing from 0.00004 N to 0.001 N in a series of 50 cc cylinders each containing 0.01546 gram barium sulphate. The upper half of each solution was withdrawn for titration with 0.004 N silver nitrate. There was a regular progression of the volume of silver nitrate required until a certain concentration of the halide was reached, at which concentration less than the expected volume was required. Having passed this concentration the progression became regular as before. Plotting the halide adsorbed against the concentration, the curves are regular except for a dip at the point showing the most favorable concentration. Favorable concentrations are LiCl, 0.00088 N; NaCl, 0.00072 N; KCl, 0.00034 N; RbCl, 0.00014 N; LiBr, 0.00068 N; NaBr, 0.00056 N; KBr, 0.00016 N; LiI, 0.0001 (?).

The transposition of insoluble oxalates by sodium carbonate solution: L. J. CURTMAN and D. HART. Working under the most favorable conditions for the transposition of calcium oxalate by sodium carbonate solution, it was found that 91 per cent. was transposed. With the oxalates of barium, strontium, ferric and ferrous iron, aluminum, nickel, cobalt, manganese, zinc, bismuth, copper and stannous tin, a transposition of 98 to 100 per cent. was obtained. The oxalates of cal-